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Original article

Neighborhood environment, physical activity, and quality of life in adults: Intermediary effects of personal and psychosocial factors

Eleni Theodoropoulou *, Nektarios A.M. Stavrou, Konstantinos Karteroliotis

School of Physical Education and Sport Science, National and Kapodistrian University of Athens, Athens 17237, Greece

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Abstract

Background: Studies have indicated that there is a positive and indirect relationship between physical activity (PA) and quality of life (QoL). The current study examined this relationship through a social cognitive model with consideration to the intermediary effects of exercise self-efficacy, and physical (PCS, physical component summary) and psychological (MCS, mental component summary) health. Additionally, this model was widened to include concepts from the ecological theory, and any causal associations among neighborhood environment, PA, and QoL.

Methods: Six hundred and eighty-four physically active adults (39.16 ± 13.52 years, mean ± SD), living in Athens, Greece, completed a series of questionnaires measuring PA, QoL, exercise self-efficacy, PCS, MCS, neighborhood environment, and family and friend support for PA. The examined models were analyzed using structural equation modeling.

Results: The social cognitive and ecological models proved to be of appropriate fit. Within the social cognitive model, PA positively affected QoL through the mediating effects of exercise self-efficacy, PCS, and MCS. With regards to the ecological model, neighborhood environment positively influenced QoL through the intermediary effects of family support for PA, exercise self-efficacy, PA, PCS, and MCS.

Conclusion: Results indicated that the most important mediators in the examined models were exercise self-efficacy and health. Further, findings demonstrated the role of neighborhood environment in enhancing PA and QoL. Future studies should be carried out applying longitudinal data for a better understanding of these associations over time.

Keywords: Cognitive; Ecological; Health; Self-efficacy; Structural equation modeling

1. Introduction

During the last 20 years there has been an increasing research interest on the prediction of quality of life (QoL).[1] QoL consists a multidimensional concept incorporating factors such as personal health, social relationships, perceived happiness, family life, occupational satisfaction, and environmental connection.[2–5] In particular, social researchers have defined QoL as a cognitive judgment of satisfaction with one's life.[2,6] Lately, various scientists have replaced the term QoL with health-related QoL, focusing on the effects of illnesses or other variables on one's perceived health status.[2,3] Despite the different definitions of QoL, it is common that QoL has been associated with various factors, such as physical and psychological health, social function, well-being, and satisfaction with life.[2–5] Further, several studies have demonstrated that participation in physical activity (PA) is an effective intervention for increasing and maintaining QoL.[2,3,7–10] Specifically, Sorensen et al.[8] indicated that participation in a 4-month exercise program increased QoL. In line with this, Wolin et al.[10] have longitudinally examined 63,152 women aged 40–67 years old, and observed that increases in PA were associated with an improvement in QoL.

The well-established positive relationship between PA and QoL has led to an examination of possible mediators that may explain this association.[11–15] Specifically, PA has been positively associated with QoL, which was defined as satisfaction with one's life, through the intermediary effects of exercise self-efficacy, physical (PCS, physical component summary) and psychological (MCS, mental component summary) health, and positive affect.[11–15] In particular, Elavsky et al.[11] observed that PA positively influenced QoL through the mediating effects of exercise self-efficacy, and positive affect. However, this causal

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* Corresponding author.

E-mail addresses: theodorelen@gmail.com (E. Theodoropoulou).

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model accounted for only 12% of the variance in QoL. Higher percentages of the variance in QoL have been found in other studies including health status as a mediator.[12–14] More specifically, McAuley et al.[12,13] have examined a social cognitive model, and demonstrated that PA positively affected exercise self-efficacy, which positively influenced PCS and MCS. In turn, PCS and MCS had positive effects on QoL.[12,13] For the development of these models both the social cognitive theory and the value that individuals place on PA were considered, as they play an important role in QoL outcomes.[2,3,12–15]

Apart from the aforementioned models, recently the associations among neighborhood environment, PA, PCS, and MCS have been examined.[16] Results have showed that neighborhood environment, which serves as an important concept in the ecological theory, was positively related to the PA, PCS, and MCS. Additionally, PA was supported to be a possible mediator in the relationship between neighborhood environment, PCS, and MCS.[16] This hypothesis could be supported by data that proved the positive associations between neighborhood environment and PA,[17] and also among PA, health status, and QoL.[12,13] In particular, Ishii et al.[17] have examined a model of the relationship between neighborhood environment and PA, in which they found: (a) direct positive effects of neighborhood environment on PA, (b) indirect positive effects of neighborhood environment on PA through the intermediary roles of social support for PA and exercise self-efficacy, and (c) direct positive effect of exercise self-efficacy on PA. In addition, positive associations among neighborhood environment, PCS, and MCS have been observed.[9,16] As far as the effects among PA, exercise self-efficacy, PCS, MCS, and QoL were concerned, these associations were well established.[12,13] Therefore, it could be hypothesized that neighborhood environment on the one hand is positively associated with PA through the intermediary roles of social support for PA and exercise self-efficacy, and on the other hand is positively related to PCS and MCS. PA seems to enhance PCS and MCS, which in turn increase QoL.

The aforementioned concepts have not been examined within the context of the same theoretical model so far. Similarly, neighborhood environment, social support, and ecological theory have not been used in tandem regarding an examination of the PA and QoL relationship. In particular, an ecological model of the association between neighborhood environment, PA, and QoL including the mediating effects of social factors, such as family and friend support for PA has not been examined so far in the literature. Therefore, the purpose of the current study is twofold. First, it aims to examine further the social cognitive model of PA and QoL proposed by McAuley et al.[13] testing its adequacy to fit in a different sample. The second purpose is to evaluate the usefulness of an ecological model of neighborhood environment, PA, and QoL. Specifically, the model proposed by McAuley et al.[13] was widened including concepts from the ecological theory,[17] with the aim to examine a model including associations between neighborhood environment and QoL. In the ecological model, the intermediary effects of family and friend support for PA, exercise self-efficacy, PA, PCS, and MCS were assessed. An original aspect of this study was the investigation of the model with the best fit of the collected data.

2. Materials and methods

2.1. Participants' recruitment and sample size calculation

The sample's selection met the following criteria: (a) participation in PA because the importance that individuals place on PA is a moderator of PA and QoL relationship,[2] and (b) 18–65 years old to exclude older adults and adolescents. In particular, the sample that was not randomly selected consisted of 752 participants who agreed to complete the questionnaires. They participated in various exercise programs in the sport facilities of the Municipality of Athens. Due to listwise deletion both of missing values and outliers, 684 participants consisting of 206 men (30.12%) and 478 women (69.88%) aged 39.16 ± 13.52 years (mean ± SD) were used for the analyses.

The sample size was calculated using the criterion of 10 participants per item (10:1 ratio).[18] Further, a statistical algorithm calculating sample size in structural equation modeling was used (www.danielsoper.com).[19] The sample size definition was calculated based on the following criteria: (a) a power of 0.8, (b) an effect size of 0.1, and (c) a significant level of 0.5.[19]

2.2. Assessments

2.2.1. PA

PA was measured using the International Physical Activity Questionnaire (IPAQ) short form.[20] The IPAQ-short form, having 7 days recall period, consists of 6 items assessing exercise frequency and duration and one item measuring sedentary behavior. The 6 items evaluated the following PA indexes: walking PA, moderate PA, vigorous PA, and total PA. The PA indexes are expressed in MET-minutes per week and are calculated as duration × frequency per week × MET intensity. The total PA index was calculated by adding the walking PA, the moderate PA, and the vigorous PA indexes.[20] Validity and reliability of the IPAQ were well established, and verified for its Greek version.[20–22]

2.2.2. QoL

The Satisfaction With Life Scale (SWLS) was used to assess QoL.[6] The SWLS consists of the following 5 items: "in most ways my life is close to my ideal", "the conditions of my life are excellent", "I am satisfied with my life", "so far I have gotten the important things I want in my life", and "if I could live my life over, I would change almost nothing". Each item was rated on a 7-point scale with higher values representing better life satisfaction. All items constituted 1 factor. Pavot and Diener[6] have reported satisfactory factorial and construct validity as well as acceptable internal consistency ($\alpha = 0.80–0.89$), and test–retest reliability ($r = 0.64–0.84$) of the SWLS.[6] In line with this, the psychometric properties examination of the Greek SWLS version indicated acceptable factorial validity, internal consistency ($\alpha = 0.90–0.93$), and test–retest reliability (ICC = 0.77).[23]

2.2.3. Exercise self-efficacy

Exercise self-efficacy was estimated using a 5-item Self-Efficacy Scale.[24] This scale was designed to estimate one's belief in his/her ability to persist in exercising under the following adverse situations: tired, bad mood, not having time, on vacation, and raining or snowing. The validity as well as